

# Ecological Knowledge, Social Networks and Co-Management: Two Coastal Communities

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## CONCEPTS

**Co-management** a collaborative and participatory process of regulatory decision-making between user groups, government agencies, and external agents (NGOs, academic and research institutions).

**TEK/LEK** the knowledge of environmental processes accumulated overtime through interaction between individuals, cultures and natural resources upon which their livelihoods often depend. Traditional ecological knowledge (TEK) differs from Local Ecological Knowledge (LEK) in that it implies a deeper relationship between resources and people based on the length of interaction, the type and purpose of that interaction and the degree to which that knowledge is integrated into the livelihoods of those individuals/groups.

**Social Networks** Relationships between individuals groups and organizations. These networks can positively and negatively impact collaborative efforts.

## A.C. DO CABO, RJ – BRAZIL

### Ecological Knowledge



Beach seining in A.C. has evolved over hundreds of years from the techniques used by the Sambaquina tribes that resided in the Brazilian southeast coastal region in pre-colonial times. Today, seiners continue to use environmental indicators such as the color and temperature of the water, and direction of currents to define daily fishing strategies. The lookout or *vigia* is the cornerstone of this type of fishing in that he visually locates and 'baptizes' the fish (determines the type, size and number of passing fishing and decides whether they are well grouped for capture). He also employs an elaborate system of hand signals to communicate the location and behavior of the fish to the seiners waiting in the canoe below. A variety of fish are captured using this method and fishing strategies are adapted slightly throughout the year. (Photo: lookout spotting incoming shoals)

### Social Networks



Traditional fishing methods often reinforce social networks. In Arraial do Cabo, beach seiners work in groups of 9-12. All groups consist of members of the same neighborhood. Although fishermen from the same neighborhoods collaborate and have strong ethnic and family ties, there is resistance to working with fishers from other neighborhoods within the same village. In fact, ethnic divisions still run strong here after 500 years of colonization. Until recently, canoes, nets and other gear were owned by groups of individuals and the profits and costs were shared by all. In the last 30 years, ownership has become severely concentrated and beach seiners feel marginalized and disempowered from this traditional activity. This has had important implications for resource management (see below). (Photo: seiner pulling in the net)

### Institutional framework



**Informal** – Beach seiners in A.C. have long managed their marine resources through a series of informal institutions that determine who, when and how seining can take place on each beach. Only a certain number of canoes are allowed on each of the four beaches in the village and each day, certain canoes are allowed to fish based on their place in the rotational access system or *corrida*. Rotational access to seining areas as well as gear restrictions were developed to limit the impact on the fishery while equitably distributing the benefits. Unfortunately, many of these informal management mechanisms are in decline which presents serious challenges to the development of co-management arrangements.

**Formal** - Brazil is currently developing a network of collaboratively managed marine protected areas called Marine Extractive Reserves. These reserves are modeled from their terrestrial counterparts that are the result of years of collective action against loggers and miners by the rubber tappers in Amazonia. What is so unique about these reserves is that they are created at the community's request. Communities wanting to co-manage their marine resources have to develop a proposal that justifies the ecological and cultural qualities of the area that warrant the creation of the reserve. Afterwards, this proposal is submitted to the Center for the Sustainable Development of Traditional Populations and ultimately, if accepted, is signed by the President of Brazil. This is the first major initiative to significantly address the needs of coastal communities in Brazil. (Photo: Top – elderly beach seiners; bottom – extractive reserve headquarters)



## BUEN HOMBRE, DOMINICAN REPUBLIC

### Ecological Knowledge



Since 1898, the community of Buen Hombre (BH), a fishing and farming village located on the northwest coast of the Dominican Republic, has actively engaged in the use, management and conservation of the marine environment. For over 100 years fishermen have interacted daily with inshore areas and mangroves. In the past 30 years they have begun exploring and fishing offshore areas. Local ecological knowledge (LEK) of the marine environment, developed over multiple generations, informs BH fishermen about the human-ecological nexus. As a result, informal marine ecosystem management strategies have developed based on this knowledge independent of the regulations and restrictions created by the Dominican government. These strategies include gear restrictions, size limits and seasonal protection of specific species based on spawning cycles. Local fishermen have also demonstrated a willingness to take significant risks to defend their livelihoods from larger vessels that illegally fish their waters. (Photo: portion of the Buen Hombre traditional territorial waters)

### Social Networks



The sustainability of the BH fishery rests in part on the internal stability of the local fishermen's association. This informal association meets regularly and discusses issues such as the health of the environment and real time management strategies based on their observations and experiences. The strength of this group is their ability to enforce the informal management measures and convey the importance of rules for those who fish in their territorial waters. The success of this organization is also tied to the tight knit association of members based on kinship and communal relationships between members of fishing crews. With sustainability as the long-term goal, fishermen work together to help and protect each other, while also ensuring that the behavior of the group is closely monitored to protect against inappropriate extraction of marine resources. Deviant behavior is handled within the group and/or larger community is quickly addressed. (Photo: Buen Hombre fishing crew with B. Stoffle)

### Institutional Framework



The development of a co-management partnership between the local community and the national government was based the recognition by both parties that the protection of marine resources in the Buen Hombre territorial waters was dependent on the participation and empowerment of local resource users. Representatives from the fishermen's association were formally deputized with the power to arrest and detain individuals fishing illegally, based on the rules established by the association. While one might interpret this as a drastic strategy which would lead to a corruption of power, it was in fact a formalization of rules already practiced and enforced within community waters. One of the benefits of the establishment of this co-management relationship was the local fishermen's ability to stop illegal net fishing engaged in by members of a community located over 30 km away. Instead of informally confronting these fishermen, possibly resulting in a violent confrontation, the fishermen of Buen Hombre were now given the power to arrest and confiscate the illegal nets. (Photo: fishing association members)

### More information

For more information on Arraial do Cabo and Extractive Reserves in Brazil:

- Pinto da Silva, P. 2004. Social Change and Conservation: Experiences from Brazil's First Maritime Extractive Reserve. Marine Policy, UK. In press.
- Pinto da Silva, P. 2002. *From Common Property to Co-management: Social change and conservation in Brazil's first maritime extractive reserve*. PhD Thesis. London School of Economics. London.
- IBAMA homepage - <http://www.ibama.gov.br/>

For more information on Buen Hombre:

- Stoffle, R. 2001. When fish is water: Food security and fish in a coastal community in the Dominican Republic. In McGoodwin, *Understanding the Cultures of fishing communities: a key to fisheries management and food security*. Fisheries Technical Paper 401. FAO. Rome.
- Stoffle, R., D. Halm and B. Stoffle. 1991. Inappropriate management of an appropriate technology: A restudy of Mithrax crab mariculture in the Dominican Republic. In J.Poggie and R. Polnac, *Small-scale fishery development: Socio-cultural perspectives*. International Center for Marine Resource Development. University of Rhode Island.
- B. Stoffle, et al. 1994. Folk management and conservation ethics among small-scale fishermen of Buen Hombre, Dominican Republic. In *Folk Management of the worlds fisheries*. C. Dyer and J.R.McGoodwin. University Press. Colorado.